A-511-415

M E E T I N G R E P O R T

Date: June 26, 1962 Place: Our Facility

25X1A Written by: [redacted]

In Attendance: [redacted] 25X1A

Subject: Parachute Modifications

Purpose: Discuss Effects of Latest Changes w/ [redacted] 25X1A

SUMMARY:

25X1A First stage suspension tests with the pack were performed on [redacted] with and without the pressure suit.

The drogue disconnect and main canopy release location problems noted at the 6/21/62 fit-up were viewed and discussed. These conditions were due to the narrower actuator pan and the modifications made to the back diagonal and main lift webs.

Since the pan width cannot be increased due to the user mobility requirement, it was decided to change the exit point of the back diagonal to the sides of the pan and route the main lift webs directly down to them, tying them in at the pans. Whereas this will not fully correct the hardware location situation, it will help. No objectionable comfort restriction is expected; however, the pack mock-up will be modified and forwarded for a fit-up and comments.

ACTION TAKEN:

Pack has been forwarded to Parachute Fabrication for modifications and trans-shipment.

25X1A [redacted] has been notified of the additional change and will arrange for fit-up.

25X1A cc: [redacted]

MINUTES OF MEETING

DATE: November 17th, 1961

PLACE: Firewel Company, Inc.

25X1A

PRESENT: [redacted]

SUMMARY:

1. DUMMY DROP TESTS AT EL CENTRO:

Six drops/day are planned. A total of fifty consecutive successful drops will be required before live jumping. To expedite testing, the timers will be set for:

Drogue deploy -------- 19,000 feet
Drogue release ------- 6,000 feet
Main deploy ---------- 5,000 feet
Reserve chute deploy-- To be resolved

1.1 Parachute:

The following parachute equipment will be supplied for these tests:

6 complete rigs (with 60-inch drogues)
2 complete spare rigs (with 60-inch drogues)
4 spare drogue packs (with 60-inch drogues)
7 spare main canopies (three of these are from the truck tests)
12 78-inch drogue canopies (six in containers)
15 extra seat slings
50 spare drogue pilot chutes, deployment bags and bridles
50 spare ejection discs

ADDITIONAL SPARE HARDWARE:

6 manual drogue and 6 manual main deployment housings and ripcord assemblies

15 green apple housings

15 manual drogue riser cable housings

15 arming cable housings

A minimum of 6 each of other cable housings will be supplied plus additional hardware necessary to support the program.

The above equipment will be to the present configuration established today with the exception of changing the drogue risers to a Type 10 webbing which is 10,000 pound test. Additional changes will be made, if necessary, as a result of additional tests being performed within the next two weeks.

25X1A

On all parachutes for drops and subsequent production, we will supply the main and manual drogue deploy cable and housings and ripcord assemblies for [redacted]

25X1A

The arming housings for the automatic arming device will have to be so routed to accommodate static line drops. [redacted] will provide keepers on the back pack for providing static line deployment. Since the dummy will slide out feet first, back down, static line will be routed at the back.

The test harnesses should have rings for reserve chute hookup. Drogue chute will be half red and half white. Main canopies will be alternate red and white panels.

1.2 Survival Kits:

These kits are to have parachute supports incorporated and the standard connection between the parachute and the survival kit.

Following will be supplied:

6 wooden mockups

2 spare wooden mockups

10 extra seat slings

1.3 Emergency Oxygen Pan:

The mockup will incorporate the green apple, cable housing and the lanyard disconnect. The emergency supply hoses will not be needed.

2. HARNESS STRENGTH TESTS:

These tests should be performed at El Centro concurrently with the dummy drops. The following will be provided:

2 harness packs and riser assemblies

2 harnesses and riser assemblies only (minus the packs)

Dummy blocks for the two harness/riser assemblies that have the packs included.

We will supply 12 drogue release mechanisms plus two mockup mechanical and oxygen pans. These will simulate volume and weight. No exterior connections are required. The necessity of using these mocked up pans plus a survival kit will be verified by [redacted] early next week. 25X1A

3. GENERAL INFORMATION:

3.1 Parachute:

25X1A [redacted] will add fabric channels for all housings wherever possible, enlarge the vest panel for drogue release mounting and mount ripcords below the capewell release as decided in the mockup at Firewel.

The survival kit accessory ring on the harness will be redesigned and angled down towards the survival kit per agreement between [redacted] 25X1A

25X1A [redacted] will provide keepers for the kidney pad on the pack and harness, plus a keeper for the shipboard oxygen lanyard disconnect. The horizontal back strap on the harness will be extended 1-3/4 inch for ripcord handle mounting.

25X1A [redacted] will provide us with drawings of the configuration showing routing, cable lengths, etc. for transmittal to 25X1A [redacted]

3.2 Drogue Release:

Additional proof loading for 6000 pounds and load cycling will be performed as discussed. Destructive tests will be performed. [redacted] requested information as it becomes available on the above. 25X1A

3.3 In-House Parachute Tests:

Testing on the parachute pack will be performed at Firewel during the period prior to the dummy drop test.

25X1A [redacted] will supply us with a simulated pack next week for this testing. Canopies will be locked in a bag to expedite repeated testing. The object of this testing is to gain as much information on cable lengths, ease of personnel movement while in the harness, premature firing data, etc.

25X1A [redacted] requested test result information as it becomes available.

3.4 Seating Configuration:

Present configuration of seat parachute pack, parachute support (2½ inches high) and vent location will remain intact.

25X1A [redacted] will pursue this further at his location to try to remove the parachute support, thin out the parachute pack and lower the vent location to allow more seating room for the driver.

3.5 Hose Lengths:

New hose lengths determined from mockup will be forwarded to [redacted] 25X1A

3.6 Survival Kits:

25X1A [redacted] The two aluminum mockups will be forwarded to as soon as possible.

3.7 Full Pressure Suits:

25X1A [redacted] suit will be returned to David Clark for:

1. Repair of the helmet
2. Incorporation of the floatation feature
3. Replacement of the internal Clark hoses with Darling hoses.

25X1A [redacted] suit will have the hoses replaced, also. No floatation installation is necessary on this suit at this time.

ACB:ds

[redacted] 25X1A

Distribution:

25X1A [redacted]

CONFERENCE NOTES

DATE: October 14th, 1960

PERSONS ATTENDING: General Flickinger - ARDC 25X1A

[redacted]

We showed General Flickinger through the laboratory and went over the test facility in detail. He expressed an interest in having means for mentally stressing the test subjects; but readily agreed that it would be rather difficult to accomplish this with our arrangement in the altitude chamber.

We discussed the suit and its hardware, the General showing considerable interest in the apparent wear of the present reflective coating. [redacted] 25X1A
25X1A [redacted] assured the General that fast depreciation of the coating had been corrected by the fabrics processing people.

During a discussion on the hardware General Flickinger expressed interest in knowing if the duality of the oxygen system would in any way contribute to a lower reliability. He stated that in programs of this nature, to his knowledge, there has never been a proven malfunction of an oxygen system. In view of this, he expressed an interest in knowing whether the duality we have incorporated is an absolute requirement. With the improved hardware developped for this system, the General questioned whether the reliability of the dual system is enough to warrant it over a single system.

25X1A During our discussions of tests run with [redacted] the General showed an interest in running ground level tests using our company subjects in the chamber as in comparison against the work we had done previously. This he felt could be done with A/P-22S suits that could be borrowed from David Clark Company from another contract without too much difficulty. However, he did not press this point too strongly.

As shown on the accompanying schedule, sled tests curve before high altitude ejection. The General recommends that we order a second suit for 25X1A [redacted] and a suit for an additional test subject which he desires to use in the program, particularly for the high altitude ejection work. The possibility of the original suit being used for any pressure work after the sled tests is highly improbable. We should have a functioning suit available for our primary test subject well after our presently contemplated test program is completed.

The sled tests will require an anthropermetric dummy. It was recommended that we order one 25X1A from [redacted] in the 90 percentile class giving us a little margin to get it into [redacted] 95 percentile 25X1A suit.

RFZ:dz

TRIP REPORT [redacted] 25X1A

COCKPIT MOCKUP AT VEHICLE CONTRACTOR

DATE: August 29th and September 10th, 1960

PERSONS PRESENT: [redacted] 25X1A

Cockpit mockups were held on both referenced dates, the second day being necessary due to a change in parachutes. Both [redacted] were checked 25X1A in the mockup with full actual assembly including full pressure suit and helmet, oxygen back pack, new type seat kit and freshly packed two-stage parachute. The seat location had been moved back approximately 3/4 inch in the head and the angle changed from 13° to 10° moving the hips rearward. This seat change was made between our first and second visits on this trip. At 25X1A the first mockup [redacted] inspected the pilot position and recommended that his boys investigate moving the entire seat assembly back three inches; however, this was impractical due to structural problems.

25X1A [redacted] filled the cockpit. He had bare clearance between his knees and the instrument panel on the first mockup; however, with the seat position moved back much more satisfactorily there was clearance. Unpressurized, he could reach all the controls. Pressurized, his motion is greatly limited; however, it was regarded as much better than mobility under the same circumstances, in a partial pressure suit.

25X1A [redacted] commented on visibility from the helmet. [redacted] 25X1A stated that this could be increased by revising the connection of the heating film on the face piece. [redacted] 25X1A will also investigate tilting the neck ring down to increase downward vision when in the cockpit. [redacted] 25X1A

25X1A [redacted] was initially disturbed to find that we had the heat film on the helmet as he was under the impression that we initially told him no face piece would be required.

Checking the fits and clearances with [redacted] 25X1A

25X1A [redacted] suit indicated that size of the man will have great influence on his mobility in the cockpit. 25X1A [redacted] is 5 foot 11 inches tall, weighing about

175 pounds. A major share of the pilots will probably not be much bigger than this. He could reach the D-Ring very well, whereas [redacted] had difficulty. 25X1A
Even when pressurized he could adequately reach it.

All things considered, the vehicle people appeared to be satisfied that we were making good progress on the workable system problems involved in the program.

25X1A [redacted]

DATE: August 30th, 1960

PERSONS PRESENT: [redacted] 25X1A

We discussed the helmet-mounted miniature oxygen anode we proposed to use in the bio-medical pack. This was initially discussed in my letter of August 23rd and is described on Firewel drawing F6642-5-65. Discussion indicated that due to the location in the helmet and the probable near constant operating temperature, the unit could be used without temperature compensation thereby reducing the outside dimensions to 5/8 thick, 1-1/4 inch O.D.

25X1A [redacted] said they could make a thirty-day delivery from receipt of the purchase order.
25X1A [redacted] volunteered to supply the purchase order number 25X1A
and will bill us accordingly.

The response time of the present unit gives 90% of the change in one minute. The signal strength is 1 microampere per square mm. of platinum sensor surface. The unit is to have a linear output of 100 mm partial pressure oxygen to 400 mm partial pressure oxygen.

Later I called [redacted] to check on 25X1A
amplification necessary for full scale recording. The

present unit output will handle full scale; however, to reduce response time anode size must be reduced, which reduces the output signal. As we are interested in a lag of not more than ten seconds, the output signal must be reduced to 6 or 7 microamperes. As it turned out, the most readily available amplifier is a Beckman Model 760 expanded scale zeromatic pH meter. Price of this unit with an adapter to install in our application is $500.00. Price of one single probe is [redacted] 25X1A

I instructed [redacted] to revise the purchase order to include the pH meter along with the instructions that the pH meter should be shipped to [redacted] and the probe to Firewel. Later conversations with [redacted] indicated that the output of the probe will be in the range of 6 to 7 microamperes. The platinum area will be approximately .040 inch in diameter. 25X1A 25X1A 25X1A

JUMP PROGRAM: EL CENTRO

DATE: September 1st through 21st, 1960

Initial jumps scheduled for first week at El Centro were postponed due to rain and lack of equipment. [redacted] were checked out for altitude conditions at Edwards Air Force Base on September 1st, 1960. The special seat kit was picked up and initial inspection indicated it looked very good. 25X1A

On September 2nd the seat kit disconnect system was checked by [redacted] in full assembly at the N.A.L.F. At first try the handle did not release. The second try was successful. The release motion must be a smooth single stroke. For this test the 13-pound basic kit was filled with 37 pounds of shot. 25X1A

The oxygen kit between the man and the parachute put additional tension on the parachute pack such that [redacted] was concerned about the release of the automatic system. Initially, the automatic release did not function due to increased friction forces in the rip cord housing resulting from the additional tension on the parachute pack. This deficiency was overcome by installing teflon-lined rip cord housings. 25X1A

FIRST JUMP: EL CENTRO

DATE: September 8th, 1960

25X1A [redacted] made the initial jump from 15,000 feet in full assembly. This assembly included the full pressure suit and helmet, oxygen back pack, weighted seat kit, B-5 parachute, reserve parachute with stop-watch and altimeter. Total weight was 320 pounds. Actual landing weight was 255 pounds (less kit and canopy). For this 25X1A jump [redacted] weighed 190 pounds.

Near-perfect conditions existed. It was very clear with wind slightly greater than 2 knots per hour. 25X1A [redacted] left the plane at 15,000 feet and planned to free fall to 5,000 feet before opening. Moderate tumbling occurred for the first few seconds; then he went into a flat horizontal spin which reached 180 RPM. [redacted] 25X1A pulled the rip cord at 7,000 feet to prevent the spin from increasing.

Discussions after the jump indicated the program was cancelled using the B-5 parachute. [redacted] made 25X1A arrangements through [redacted] and Wright Field to 25X1A have [redacted] 25X1A pick up two of the existing two-stage high altitude parachutes being used in another program.

The 35 mm colored motion picture film which would have shown the full extent of the spins was entirely ruined in processing; however, figures developed from other film documentation indicated that accelleration of 40 RPM occurred in less than one second at several points during the free fall.

Two two-stage parachutes were picked up at Wright Field. These chutes were the same units as used by [redacted] 25X1A 25X1A [redacted] in his balloon jump from 102,000 feet. These parachutes consist of a standard pilot chute, a six-foot drogue and a standard C-9 canopy. This assembly has two full sets of controls; and two timers, one timer for opening the drogue chute and one timer for opening the main chute. It also has two pulls; a manual pull for the drogue chute and a manual pull for the main canopy. The assembly is packed in a modified B-5 cover using a standard B-5 harness. This assembly is 1 to 1-1/2 inches

thicker than the standard 28-foot parachute.

DATE: September 14th, 1960

Two dummy drops were made from 15,000 feet with 300-pound dummies having a simulated oxygen pack mounted between the dummy torso and the parachute pack. The dummy drop worked as expected, the drogue chute opening approximately twelve seconds after dropping from the aircraft and the main chute opening at approximately 6400 feet.

Live jumps could not be scheduled until September 20th due to availability of airplane, wind conditions and higher priorities of other programs. The first live jump was from 15,000 feet with [redacted] jumping first as a spotter to check wind and drift. [redacted] weight on these jumps was 325 pounds. Additional weight came from the battery added for face piece heat and the heavier parachute. 25X1A 25X1A

Both the spotter and actual test jumps were very encouraging. No tumbling or violent gyrations occurred. [redacted] did experience some oscillation on his descent. The drogue chute opened twelve seconds after leaving the aircraft. The main canopy opened at 6400 feet. The only casualty in this jump was the seat kit which had two slight fractures when it slammed to the ground. However, [redacted] people were on hand and took it back immediately for repair. 25X1A 25X1A

Second live jump was scheduled for September 21st from 30,000 feet with suit pressurized to an equivalent altitude of 27,000 feet. The actual jump was made from 32,000 feet giving approximately 1 PSI pressure in the suit. [redacted] made this jump without the seat kit or at about 278 pounds. 25X1A

[redacted] jumped first from 32,000 feet, drogue chute opening as scheduled at eleven or twelve seconds after leaving aircraft. He opened his main chute manually at 14,000 feet because he had several lines over his parachute and two gores were completely ripped. Ripped gores were from top to bottom at the seam where the drogue chute attaches. [redacted] drifted several miles 25X1A 25X1A

off the drop zone but was able to advise the jump master that it would be alright for [redacted] to jump even though he himself had to use his reserve chute to descend. 25X1A

25X1A [redacted] drogue chute opened as scheduled and he was able to see that his main chute had been ripped by the opening forces from the drogue chute. [redacted] 25X1A
25X1A [redacted] elected to descend by his drogue chute as far down as possible to stay in the drop zone area. His main chute opened at the prescribed 6400 feet. At approximately 3,000 feet he opened and deployed his reserve chute and gathered the main chute in his arms to prevent fouling. It was fortunate that the seat kit was not used on this jump as the reserve chute is a twenty-four footer, the descent rate being in the range of 28 feet per second
25X1A at the weight [redacted] jumped. Normal descent rate is in the range of 22 feet per second.

Examination of the parachutes indicated a general deficiency in the parachute system. This deficiency is in the method of attaching the drogue chute to the main canopy and in the packing arrangement which can permit the lines to foul on the two timing mechanisms which obviously happened to cause the extensive damage. [redacted] 25X1A
chute failed quite similarly to [redacted] but was not 25X1A
ripped as severely. As the test equipment was damaged beyond repair capabilities of the local group, the test program was suspended.

GENERAL CONFERENCE ON SPECIAL PROGRAM

PLACE: Washington, D.C.

DATE: May 22nd, 1961

PERSONS PRESENT: General Flickinger 25X1A

[redacted]

Progress on the parachute program to date was discussed. On-the-deck capabilities were stressed. 25X1A
Films showing the successful parachute opening at 80 MPH and the most recent static firing were shown. [redacted] stated that, according to their results, it appeared that 65 knots (80 MPH) is the minimum speed at which the system will work. At present we will settle for this. In the future, we will possibly work towards full recovery from a static position.

The three-timer pack was shown and functionally described. There did not appear to be any great objections on the deployment and release of the drogue. However, it was brought out that for successful ground level ejection the timer has to have a '0' setting due to the 140-foot altitude capability of the catapult. The standard F1B automatic release used in the pack is incapable of being reliably set at less than one second. This one-second delay prevents positive assurance of opening of the parachute on ground level ejection at 65 knots. The successful test run by [redacted] people was done 25X1A
through a direct pull on the pack opening pins. Because there is not a satisfactory timer available for deployment of the main chute we will continue to use the F1B for the test program, but the low-speed low-level parachute actuation will be done to direct pull. [redacted] 25X1A
25X1A [redacted] stated, on May 25th, that we will make every effort toward securing zero time releases in as short a time possibls. We will attempt to get them from known sources and start a development program of our own.

25X1A [redacted] stated that he is very seriously considering the use of the Pacific Scientific Air Speed Sensor for control of the seat separation actuator. He said that due to the low 'q' at high altitudes they would use a sensor set in the range of 250 knots EAS to avoid premature separation at higher altitudes. The use of the Pacific Scientific parachute release was discussed, but 25X1A [redacted] reported that it had failed Wright Field qualification tests. However, he stated that the U. S. Gauge release should be through qualification tests very shortly. The latest report is that it has successfully completed qualification testing. We will investigate both U.S. Gauge and Pacific Scientific releases to see if we can use them in the mechanical pack for the main parachute opening as well as to reduce the complexity of the overall system. It was suggested that we also investigate other means of supplying power for opening parachutes such as pneumatic and pyrotechnics.

General Flickinger stated that he expected all parachute development testing and reliability testing for the present program to be completed by September 15th.

25X1A [redacted] stated that most of their difficulties have been in their rockets and initiators and as the problem has been identified, it will be eliminated from causing difficulty on future tests. He stated that the rocket which they will use will burn out at .45 seconds; seat separation will be at .60 second from initiation.

General Flickinger stated that the complete maintenance van and transport van should be at the site by October 1st. We can expect people to be available between August 15th and September 1st for suit fitting prior to processing through our program. Present thinking is for these people to come in pairs at intervals of six weeks. Previous to this, General Flickinger intends to send his operating support crew through the suit facility and training facility for familiarization and training.

General Flickinger requested additional material which he can use for briefing purposes. This material will cover areas which we are working. [redacted] 25X1A

will prepare functional sequences describing the total escape systems. [redacted] will supply information covering full pressure suits. We will supply information covering: 25X1A

1. Hot altitude training chamber
2. Maintenance van including test equipment and altitude chamber
3. Pilot transport van
4. Operational vehicle mounted system indicating provision for high-temperature, duality and compactness of system

This information will be given on display boards as well as 3¼" x 4" lantern slides (18" x 23" Banebridge Board - 1/8" thick).

The schedule for the drogue parachute program was discussed. The sled tests at Edwards will be set up the first two weeks of June, the calibration run the week of June 19th. The week of June 19th is the week scheduled for the high-altitude high-mach number tests of the ribbon parachutes and ballutes at AEDC. As this should be completed within one week, no great conflict is expected.

25X1A [redacted] was requested to make dacron covers for the test parachute packs to be used in the tunnel at AEDC. A third dacron cover will be made to protect the pack on one of the original Model D parachutes which will be returned from El Centro for use with the 4-foot balloon in the tunnel. [redacted] was requested to make three high-temperature coveralls to protect the dummy during these tests. [redacted] will make arrangements to get the dummy to [redacted] and the Model D parachute from the West Coast to [redacted] 25X1A 25X1A 25X1A 25X1A

25X1A

NOTES OF MEETING
AT [redacted]
March 22nd, 1961

PERSONS
PRESENT: [redacted] 25X1A

There was some general discussion on the test program and results to date using a Model 'A' type parachute pack for drogue configuration testing.

1. A minimum of forty more drogue tests are required to adequately determine first-stage configuration. Six complete new parachute packs will be required with six additional seat harnesses.

2. These parachutes will be made in the 'D' configuration with the back pan twenty-one inches long. Maximum parachute depth will be six and one-half inches. Drogue depth will be three inches providing approximately 300 cubic inches for the drogue pack.

3. New type, flat first-stage shoulder releases will be supplied by Firewel for two assemblies. The other four parachute assemblies will use the [redacted] releases. 25X1A
The only timer in the pack will release the drogue. The test program will be set up for static line deployment. This timer will be calibrated at El Centro along with the reserve recovery timer to minimize the free fall between drogue release and deployment of the recovery parachute.

4. The parachute harness will be the same design as Model 'A' but of Type 22 webbing. Seat harnesses will be changed after ten to twelve test drops. D-Rings for attachment of reserve parachute will be moved up on the harness to improve loading conditions on deployment. Harnesses will be equipped with rings for seat kit attachment. The packs will be designed for the T-10 canopies; however, dummy or condemned canopies will be used during the test program to prevent damage to serviceable equipment. The drogue parachutes will be the same ones previously used in the El Centro tests.

5. Due to the recent design changes in the oxygen pack, work on the Model 'C' parachutes will be suspended until further notice.

25X1A 6. [redacted] recommended that we get high speed opening force data as soon as possible to determine if the canopy designs are strong enough. He indicated that the whirl tower could be used for these tests.

25X1A 7. [redacted] will provide one additional ribbon chute to give a descent rate of 150 to 160 FPS with a total dummy weight of 370 pounds. Total length of the risers and shroud line will be twenty-two feet from shoulder to skirt.

25X1A 8. [redacted] will be ready with the first three parachute assemblies at El Centro on April 14th. The other three assemblies will be available within the next two weeks.

25X1A 9. [redacted] will send a price quotation as soon as they have determined total requirements.

10. Firewel will provide the back pans and cable housings with end fittings as required.

[redacted] 25X1A

RPZ:ds

25X1A cc: [redacted]

25X1A

[redacted]

Feb. 9th, 1961

SCHEDULE:

February 20th: Set Up at El Centro for drogue tests with Model A Parachute Assemblies (3)

Persons Present: [redacted] 25X1A

(1) 51-inch - 2 each
(2) 60-inch - 2 each
(3) Ribbon - 2 each

March 6th: Set Up at El Centro for 35,000 foot tests Continue drogue tests also

Persons Present: [redacted] 25X1A

Three Model B Assemblies

March 20th: Truck Tests with Model B and Model C Assemblies

Persons Present: [redacted] 25X1A

Two Model C Assemblies available
Three Model B Assemblies available

Sled Tests and Live Jump schedules to be established after some of the above test work has been accomplished.

MODEL DEFINITIONS:

Model 'A': Existing two-stage parachute assemblies to be used for testing of drogue parachutes only.

Model 'B': New design two-stage parachute for test with dummy drogue and standard T-10 canopy.

Model 'C': Standard one-stage T-10 canopy with oxygen pack.

Model 'D': Final test stage configuration.

Model A:

25X1A [redacted] will supply new drogue parachutes for stabilization tests; 60 and 51 inch diameter guide surface type. Lines will meet and form a single riser at a point approximately 80 inches below the skirt of the parachute. The single riser line will be approximately ten feet long parting four and one-half feet above the shoulder to connect to the releases. Total shroud riser lines will be approximately twenty-two feet. A ribbon chute using the same type of risers is to be supplied for test. The size is to be determined, but will have approximately the same drag as 60-inch diameter guide surface.

High speed opening test is to be run using F3D to determine structural integrity of the drogue assembly. These tests will be run at 400 knots EAS, 35,000 feet or as close to this altitude and speed as is possible with the F3D with static line actuation. Due to the size of the launching chute on F3D a seat kit cannot be used. However, total assembly weight will run 310 to 320 pounds. All spares to maintain the program will be 25X1A supplied by [redacted] and will be made available by them at El Centro. No changes are required on these parachute assemblies except previously mentioned drogue configurations. Initial tests on the new drogue will not require recovery by the main chute. Recovery will be by a reserve parachute. When a stable assembly has been determined, the test will be set up to permit recovery by the main parachute.

Model B:

This is a two-stage assembly fabricated for the purpose of testing deployment of the individually-actuated main canopy past the drogue pack. On these assemblies the drogue pack will be a dummy of the estimated size required for the final design. As this design will require the addition of a third F1B timer, Firewel will repackage the oxygen supply in an attempt to save space and weight in the assembly. In this parachute the F1B actuating timer will be mounted on the main back pan. The pilot chute will be the same as used on the Army Halo parachutes. Main cables and connections will be mocked up. [redacted] is to investi- 25X1A gate the two-cone design of the Halo pack. The principal problem in pack design is high wind blast with low opening forces. Three Model B parachutes are required for test purposes.

Model C:

This is a single-stage thirty-five foot T-10 canopy parachute with new-style oxygen pack incorporated. This

parachute is intended as a back-up for the two-stage system being developed. It will be used only if time or financing does not permit us to proceed with the two stage development. [redacted] will investigate modifying a standard Halo pack assembly to incorporate a new oxygen pack. If modification is required to increase wind blast it will be modified similarly to the P-9V pack. [redacted] hardware will be used for the main canopy releases. Rings will be supplied for reserve parachute mounting. The present anticipated schedule is one truck test and one sled test, unless the two-stage development is cancelled out.

25X1A

25X1

25X1

Model D:

Model D parachute will be the final configuration of the features being developed under Model A and Model B tests. It will have independent function of drogue chute and main canopy. All advantageous features and improvements of Model A and Model B will be incorporated in this design. The drogue release shall be of a multi-directional type. A new oxygen back pack configuration shall be used. Three timers will be incorporated in the mechanical package.

PARACHUTE MEETING:

DATES: February 6th and 7th, 1961

PERSONS PRESENT: [redacted] 25X1A

GENERAL DISCUSSION:

As agreed upon in the parachute meeting of February 1st and 2nd, actuation of the drogue and main canopy were separated. An additional timer is to be provided for the deployment of the main canopy and the two-stage assembly. The general sequence, as agreed upon at this meeting and the previous meeting, is that below 15,000 feet the drogue will not be deployed. The main canopy release will be set for 15,000 feet and one second, with the standard tolerances $\pm^{.3}_{.0}$ sec. The drogue will be actuated above 15,000 feet with the timer set for one second from seat separation. The drogue release will be set to 17,000 feet and one second. This provides sufficient time for the drogue to float away from the man before deployment of the main parachute. An aneroid block will be developed by the Firewel Company to prevent the drogue from being deployed below 15,000 feet. Elimination of drogue function at low altitude simplifies 'on-the-deck' drogue design. Initially the timers were set to one-half second but the releases cannot be set with any degree of accuracy or reliability to less than one second.

[redacted] stated that he believed 25X1A
that the T-10 would function satisfactorily up to speeds of 260 knots EAS at 15,000 feet. Both he and [redacted] 25X1A
were of the opinion that the speed would have decayed from 400 knots EAS to 260-280 knots EAS from ejection to main canopy deployment. Opening the T-10 at 260 knots EAS will give the man an opening shock of 22-25 G'S, which is undesirable but permissible.

25X1A [redacted] hardware was discussed for main canopy releases. [redacted] said that the Air Force was not very enthusiastic about it and that when the Navy used it they used a bridge web between the risers to prevent loss of canopy should one release accidently open. These releases will be incorporated in our Model O.

Parachute Meeting

We ran some suspension tests to determine if we should re-locate the main canopy releases as well as drogue releases. On design of the harness, there is not much that can be done to improve the position of the man when suspended from either the main or drogue without relocating them at the top of the shoulders. Harnesses are so designed as to carry the full weight on the front strap of the harness which causes the man to be angled down, his back toward the ground at approximately a five to seven degree angle.

PARACHUTE MEETING

DATES: Wednesday, February 1st and Thursday, February 2nd, 1961

PERSONS PRESENT:

25X1A

[redacted]

- Firewel Company
- Firewel Company
- Firewel Company
- WADD
- WADD
- WADD
- WADD
- ARDC
- ARDC
- ARDC
- ARDC
- David Clark Company
- David Clark Company
- [redacted]
- Contractor

25X1A

SUMMARY:

A. Fabrication and Design:

1. Build three rigs with standard 35-foot canopy (T-10 type) and dummy first-stage with provision for oxygen back pack.

2. Rework the existing two-stage assembly to incorporate drogues in the range of sixty inches in diameter.

3. Build three assemblies with standard 35-foot T-10 type canopies without dummy first-stage but with provision for oxygen back pack.

4. Accellerated design program on independent first stage parachute.

B. Testing:

1. Thirty-five foot canopy chutes will be tested for low level capability at El Centro, drop tests and truck tests.

2. Simultaneous tests will be run using the two-stage assemblies to develop a stable drogue design which can be later incorporated into the parachute system.

THURSDAY, FEB. 2nd, A.M.:

The general problem was discussed involving the escape systems required for this program. The particular areas covered were:

1. Low speed, low altitude
2. High speed, high altitude
3. High speed, low altitude (400 knots, 15,000 ft and lower)

The general opinion of the authorities in the group was that we would have to shade our requirements, i.e. exclusive areas where emergency escape is remote and concentrate in the areas where experience has shown most emergencies occur. Therefore, the engineers were instructed to concentrate on low speed - low altitude escape and to investigate the incorporation of a drogue for stability independently.

The films were shown from the first drop at El Centro using 51-inch parachutes and seven-foot shroud lines. This film did not show a great deal except pronounced blanketing of the first-stage parachute by the gyrating dummy.

The possibility of escape in maximum conditions was discussed by Sheppardson and Flickinger and were in general agreement that we should not be required to work to the ultimate of the flight regime. As stated earlier, everyone was in agreement that 90 to 95 per cent profile should be considered with emphasis on low level.

Discussions on simplification and improvement of mechanical aspects of the parachute assemblies were academic. Inasmuch, it was later decided to revise the basic approach to the two-stage problem.

The program selected to resolve the parachute problem was to separate the first and second stage giving independence of function and operation to each. As initially designed in our system as well as the Kittinger system, the drogue was released to extract the main canopy. In the system we intend to develop, the drogue will either be separated or retained but not required to extract the main canopy. Our system will have a separate standard release for main canopy deployment. The drogue release mechanism will incorporate an aneroid

block to limit actuation to altitudes above 15,000 feet. With this provision, only the main canopy will be functional for low level escape, which is particularly important for escape on the deck.

It was decided that Monday, February 6th, an engineering meeting would be held at [redacted] 25X1A
25X1A with [redacted] representing Firewel, [redacted] 25X1
representing ARDC, with a parachute expert present from WADD. The WADD engineer will be assigned to the program
25X1A to work with [redacted] on the pack and canopy design and shall work at [redacted] as long as requir- 25X1A
ed.

Lengthy detail discussions on the program were held going over much of the same ground as the previous evening. The film of the second drop test was shown (1) 72-inch drogue, 125-inch lines (2) 51-inch drogue, 125 inch lines. Item 1 appeared to stabilize the dummy but at about 6,000 feet collapsed and streamed; recovery was by the reserve parachute. Item 2 appeared to stabilize the dummy and extracted the main canopy as scheduled. In both cases stabilization appeared to be less than adequate but somewhat improved from the first drop tests.

25X1 [redacted] expressed doubt as to whether the first stage releases functioned. On Item 1 he stated the resistance of the pilot chute plus the streaming drogue should have been enough to extract the main canopy had the releases functioned.

RFZ:ds [redacted] 25X1A

September 29, 1960

CONTINUING TEST SCHEDULE FOR
FULL PRESSURE SUIT

Week of October 10th:

Two 8-hour Heat Chamber Comfort Runs
Cold Altitude Tests — Tues - Oct. 11

25X1A [redacted]

Week of October 17th:

25X1A Trip to [redacted] Denver to Check Bio-Medical Instrumentation. Later part of mth.

Week of October 31st:

Explosive Decompression Tests at Andrews Air Force Base.

Week of November 7th:

Cold Water Immersion Tests
Life Raft Survival
Recirculating System Tests